

REMARKS

Reconsideration of the application in light of the amendments and the following remarks is respectfully requested. Applicants submit that this Amendment places the application in condition for allowance and/or better condition for appeal and requests entry of this Amendment with the Examiner's approval.

Status of the Claims

Claims 1-19 are pending. Claims 1, 16, 17, and 19 have been amended. No new matter has been added.

Claim 16 has been amended to remove an unnecessary repetition of the word "the." No other amendments to Claim 16 have been made. This amendment does not change the scope of the subject matter recited therein.

Rejection Under 35 U.S.C. § 112

Claims 1-19 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter of the invention. The Examiner contends the feature "three dimensional shapes of objects" is unclear, and further contends that there is no connection between the objects and the x-ray imaging systems. (Detailed Action, item 2, page 2.)

Claims 1, 17, and 19 have been amended to recite "three dimensional external shapes corresponding to three dimensional external shapes of the X-ray imaging system." Support for this amendment can be found in the specification at page 11, lines 29-31. Applicants submit that the claims as amended particularly point out and distinctly claim the subject matter of the invention.

Wakabayashi cannot be used to meet the Examiner's burden of establishing a case of *prima facie* obviousness because there is no motivation to combine Wakabayashi with either Iizuka or Alexandrescu. The Examiner's proposed motivation that a person would be motivated to prevent a collision between various objects (e.g. x-ray imaging systems, patient support, personnel) within the radiographic x-ray device by monitoring the positions and the positional relations of the various objects is not disclosed or suggested by Wakabayashi because Wakabayashi is directed to an entirely different problem, i.e., analytical model formulation for numerical analysis, specifically using the finite element method. (Column 1, lines 5-12.) The Examiner must show some objective teaching from the art that would lead an individual to combine the references, i.e., there must be motivation. In particular, "[t]he mere fact that the prior art may be modified in the manner suggested by the examiner does not make the modification obvious unless the prior art suggested the desirability of the modification." *In re Fritch*, 972 F.2d 1260, 23 U.S.P.Q. 2d 1780, 1783 (Fed. Cir. 1992) (emphasis added). Wakabayashi and the other prior art of record provide no suggestion that it would be desirable to modify Wakabayashi in the manner suggested by the examiner. As discussed above, Wakabayashi is directed to a system and method of converting voxel data to octree data to reduce the number of elements to be calculated using the finite element method. (Column 1, lines 5-42.) The finite element method is an analysis method for calculating stress distributions, etc. by calculating stress and/or strain acting between adjacent cells in analytical models. (Column 14, lines 53-55.)

In contrast, Applicants' claimed invention is directed to creating voxel trees having the same shape as the outer shapes of multiple X-ray imaging mechanisms. (Specification, page 12, paragraphs 2-3.) Collision detection calculations are performed between voxels to determine whether there is actually collision between the imaging mechanisms. (Specification, page 13, paragraph 3.) This data is utilized to control the positions of the actual imaging mechanisms. (Specification, page 14, paragraphs 2-4.) Wakabayashi does not disclose or suggest the use of voxel trees for collision detection in the motion control of any device, much less a medical or x-

ray device. The Examiner appears to be using “selective hindsight” which the Court of Appeals for the Federal Circuit has condemned as being “no more applicable to the design of experiments than it is to the combination of prior art teachings. There must be a reason or suggestion in the art for selecting the procedure used, other than the knowledge learned from the Applicant's disclosure.” *In re Dow Chemical Co.*, 5 U.S.P.Q. 2d 1529, 1531 (Fed. Cir. 1988) (citations omitted). Accordingly, there is no motivation in Wakabayashi to combine voxel trees with the disclosure of Iizuka or Alexandrescu to yield the present invention.

Applicants' invention also provides an unexpected advantage relating to the collision detection techniques that would not be obvious to one of ordinary skill in the art by reviewing the disclosures of Iizuka, Alexandrescu, and/or Wakabayashi. In the present invention, collision detection for two voxels is performed by rotating the sides of one voxel such that they are aligned with Cartesian coordinates. Next, the voxel for which the detection is being performed is rotated by the same amount. Then, calculations are made to determine if the voxel for which the detection is being performed is in a certain region of the Cartesian coordinates to determine if a collision has occurred or will occur.

The unexpected advantage obtained by using voxel data as claimed arises from the way the voxels are rotated. Because voxels are formed by splitting up a rectangular solid that encompasses an object, all voxels rotate in the same direction when the object is rotated. In other words, rotation does not have to be performed on all the voxels. Collision detection can be performed by rotating a single voxel, and the motion of the remaining voxels can be calculated by less processor intensive translations. If the object is expressed as small surfaces (Standard Triangle Language) and a similar rotation operation is performed, the subsequent collision detection operation will require more computation. Furthermore, since the surfaces are all oriented in different directions, each one needs to be rotated. These issues and advantages regarding the use of voxel data are specific to collision detection and demonstrate that voxel data used for collision detection as in the present invention actually requires less computer processing and is directly contrary to the disclosure of Wakabayashi. According to Wakabayashi, “no

If there are any other issues remaining which the Examiner believes could be resolved through a Supplemental Response or an Examiner's Amendment, the Examiner is respectfully requested to contact the undersigned at the telephone number indicated below.

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Respectfully submitted,

By

Richard J. Katz

Registration No.: 47,698

DARBY & DARBY P.C.

P.O. Box 5257

New York, New York 10150-5257

(212) 527-7700

(212) 527-7701 (Fax)

Attorneys/Agents For Applicant